What is claimed is:

1. A method of transmitting or retransmitting a packet in a communication system comprising:

determining a modulation and coding scheme (MCS) and corresponding resource allocation as a function of at least one of a determined past, a determinable current, and a future statistic of at least one of channel conditions and resource allocation; and

transmitting a coded modulated version of said packet in said communication system according to said MCS.

2. The method of claim 1, wherein the modulation and coding scheme (MCS) and corresponding resource allocation is determined as a function of at least two of the determined past, the determinable current, and the future statistic of at least one of channel conditions and resource allocation.

3. The method of claim 1, wherein any given transmission attempt (k^{th}) of said packet of a plurality of permitted transmission attempts (M_{max}) satisfies a constraint that a residual packet error probability after M_{max} is below a desired target error rate.

4. The method of claim 3, wherein said resource allocation and MCS are determined at each said K^{th} transmission of the packet to reduce an expected value of a cost while satisfying the constraint of said residual packet error probability.

5. The method of claim 4, wherein the cost is a function of an expected value or average operation and said residual packet error probability is a function of a resource allocation during the i_{th} transmission attempt of the packet (where i=1 to M_{max}) and a channel condition during the i^{th} transmission attempt of the packet and the cost.

6. The method of claim 3, wherein an optimal-approaching choice of resource allocation, includes determining at least one of the optimal-approaching resource allocations of (a) a first transmission of the packet, (b) the i^{th} transmissions of the packet (for $k <= i < M_{max}$), and (c) the last k^{th} transmission of the packet ($1 <= K <= M_{max}$).

7. The method of claim 6, wherein the optimal-approaching choice of resource allocation for a first transmission is obtained by computing a minimum of a set of cost values subject to a constraint which is a function of a resulting frame error rate.

8. The method of claim 7, wherein the set of cost values is obtained by taking a sum of an actual cost associated with each choice of resource allocation for the first transmission and an estimated cost of any choice of resource allocation for transmissions two through M_{max} which satisfy the constraint, including

making a choice of resource allocations for the second through last transmissions,

for every choice of resource allocation for the first transmission, compute the estimated costs associated with the choice made for the second transmission through the M_{max} transmission,

computing the sum of the cost of all the estimated costs and the actual cost associated with the choice made for the first transmission to produce a set of costs,

selecting values in the set of costs for which the frame error rate constraints are met, and

selecting the minimum value of the values selected as an optimal value.

9. The method of claim 6, wherein the optimal-approaching choice of resource allocation for the i^{th} transmission (for $k <= i < M_{max}$) decided at any kth transmission stage (1 <= k <= Mmax) is obtained

by computing the minimum of a set of cost values subject to a constraint function expressing the resulting residual error probability.

10. The method of claim 9, wherein the set of cost values is obtained by taking the sum of fixed costs associated with transmissions 1 through (i-1) based on deterministic resource allocation and channel conditions, a cost of every choice of resource allocation for the i^{th} transmission, and an estimated cost of any choice of resource allocation for transmissions (i+1) through M_{max} subject to satisfying the residual probability of error constraint function.

11. The method of claim 6, wherein the optimal-approaching choice of resource allocation for the last transmission decided at any kth transmission stage (1<=k<=Mmax) is obtained by computing the minimum of a set of cost values subject to a constraint function expressing a resulting residual error probability.

12. The method of claim 11, wherein the set of cost values is obtained by taking the sum of the actual costs associated with all previous transmissions and expected costs of every choice of resource allocation for the last transmission subject to satisfying the residual error probability constraint.

13. The method of claim 6, wherein the optimal-approaching choice of resource allocation includes iteratively obtaining optimal values of the resource allocation at every stage beginning with the M_{max} transmission and working backwards to the kth transmission of interest

14. The method of claim 13, wherein the optimal values of any stage i may be estimates or expectations, where at each step of the iterative process, resource allocations that do not satisfy the residual probability error constraint function are excluded.

15. The method of claim 14, wherein the expectations are conditioned on deterministic resources and channel conditions measured, computed or assumed from stages previous to the ith stage.

16. The method of claim 3, wherein a near-optimal-approaching choice of resource allocation, includes, at any said K^{th} transmission of the packet, determining a candidate vector value of resource allocations of current and future transmission of the packet up to M_{max}.

17. The method of claim 16, wherein the resource allocation at any given stage is obtained by

fixing any candidate vector value of resource allocations of the current and future stages up to M_{max},

if a total probability of residual error for the candidate resource allocation is larger than a target, the candidate resource allocation is rejected as infeasible,

among all feasible candidate resource allocations, selecting the one with a minimum total cost,

in case of ties, breaking ties in favor of the resource allocation vector that has the lowest residual error probability, and

setting a first element of the resource allocation vector as the desired resource allocation for the current stage.

18. The method of claim 17, wherein fixing any candidate vector value of resource allocations of the current and future stages up to M_{max} includes

fixing a vector value of the future channel conditions with an associated channel condition vector probability of occurrence obtained from a joint probability density function that models the channel

during times of the impending current and future transmissions of the packet,

finding the conditional residual error probability for each candidate resource allocation conditioned on the fixed future channel conditions by looking up a reference error curve,

multiplying the conditional error probability with the channel condition vector probability,

varying the channel condition vector and its associated probability and repeating said fixing, finding, and multiplying steps and accumulate probabilities for each iteration to yield a total probability of residual error, and

summing the costs of the candidate resource allocation components to obtain a total cost of the candidate resource allocation.

19. The method of claim 18, wherein the reference error curve is expressed as 0 if a desired signal-to-noise, due to the combination of fixed resource allocation and past, present and future channel conditions, is exceeded and 1, if not.

20. The method of claim 3, wherein a near-optimal-approaching choice of resource allocation, includes , at any said K^{th} transmission of the packet, determining a candidate resource allocation of the current transmission of the packet and candidate vector value of resource allocations of the future stages up to M_{max}.

21. The method of claim 20, wherein the resource allocation at any given stage is obtained by

fixing a candidate resource allocation for the current stage,

fixing any candidate vector values of resource allocations of future stages up to M_{max},

setting the total cost of resource allocation at the current stage as a function of the choice of current resource allocation to the

expected minimum cost of the future allocation plus the cost of the choice of current resource allocation,

among all feasible current resource allocations, selecting the one with the minimum total cost of resource allocation, and

in case of ties, breaking the tie in favor of the current resource allocation vector that has the lowest residual error probability, where the current resource allocation that results in a minimum total cost is the desired resource allocation for the current stage.

22. The method of claim 21, wherein the step of fixing any candidate vector values of resource allocations of future stages up to M_{max}, includes

fixing a vector value of the future channel conditions with an associated channel condition vector probability of occurrence obtained from a joint probability density function that models the channel during times of the impending current and future transmissions of the packet,

finding the conditional residual error probability for the choice of current resource allocation and candidate future resource allocation conditioned on the fixed channel conditions by looking up a reference error curve,

checking if the conditional error probability is greater than the target residual error probability and if yes, then the candidate future resource allocation is rejected as infeasible,

if feasible, summing the costs of the candidate resource allocation components to obtain a total cost of the feasible candidate future resource allocation,

selecting among all feasible candidate future resource allocations for that channel condition vector, the one with the least cost, wherein if no candidates are feasible, selecting the largest resource allocation,

multiplying the conditional error probability of the least cost future resource allocation with the associated channel condition probability,

varying the channel condition vector and the associated probability and repeating the fixing, finding and checking steps and averaging the least cost resource allocation by weighing with the channel condition vector probability of each iteration and summing to yield the average cost of future resource allocation given the choice of resource allocation for the current stage,

accumulating the product of the conditional error probability and channel condition probability over all channel conditions, and

checking if the resultant is less than a target residual error probability, and if so, the choice of current resource allocation is feasible

23. The method of claim 22, wherein the reference error curve is expressed as 0 if a desired signal-to-noise, due to the combination of fixed resource allocation and past, present and future channel conditions, is exceeded and 1, if not.

24. The method of claim 3, wherein a near-optimal-approaching choice of resource allocation, includes, at any said K^{th} transmission of the packet, determining a channel condition vector of the current transmission of the packet and future transmission of the packet, having associated probability retrieved from a joint probability distribution function of channel conditions and determining a candidate vector value of resource allocation of the current transmission of the packet and candidate vector value of resource allocations of the future stages up to M_{max}.

25. The method of claim 24, wherein the resource allocation at any given stage is obtained by

fixing a channel condition vector for the impending and future transmissions with associated probability taken from the joint probability distribution function of channel conditions,

fixing any candidate vector value of resource allocations of the current and future stages up to M_{max}, said fixing any candidate vector value of resource allocations further including

finding the conditional residual error probability for the choice of current resource allocation and candidate future resource allocation conditioned on the fixed channel conditions by looking up a reference error curve,

checking if the conditional error probability is greater than the target residual error probability and if so, then the candidate future resource allocation is rejected as infeasible,

if feasible, summing the costs of the candidate resource allocation components to obtain a total cost of the feasible candidate future resource allocation,

among all feasible candidate future resource allocations for the channel condition vector, choosing the one with the least cost,

if no candidates are feasible, choosing the largest resource allocation,

selecting the choice of current resource allocation of the least cost future resource allocations and the associated channel condition probability,

varying the channel condition vector and an associated probability and repeat the finding, checking, summing, choosing, and selecting steps and accumulating the channel condition probability separately in all cases where the choice of current resource allocation coincide, and

assigning the choice of the current resource allocations that is most likely to cause a least cost resource allocation overall as the current resource allocation with the largest accumulated channel condition probability.

26. The method of claim 25, wherein the reference error curve is expressed as 0 if a desired signal-to-noise, due to the combination of fixed resource allocation and past, present and future channel conditions, is exceeded and 1, if not.

27. The method of claim 1, wherein resource allocation determinations are made using a pre-computed matrix data structure, containing the total resource cost and an indicator function of success or failure or a conditional probability of failure, which is row indexed by an ensemble of channel conditions and column indexed by the resource allocation (MCS) combinations.

28. The method of claim 27, wherein the pre-computed matrix data structure may be defined, maintained and looked up for each type of channel possibly associated with a user, that includes doppler or rate of variation of channel conditions.

29. The method of claim 27, wherein the pre-computed matrix data structure may be defined, maintained and looked up for each packet size possible in the communication system.

30. The method of claim 27, wherein the pre-computed matrix data structure may be re-used for subsequent transmissions by using a subset of the data structure corresponding to the channel conditions and resource allocations of past transmissions.